Attorney Docket No.: ABBLUM/246/US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of Mario C. Baldassari et al

Serial No. 09/638,374

Examiner: Norton, Nadine Georgianna

Filing Date: August 15, 2000

Group Art Unit: 1764

For: Multiple Stage Catalyst Bed Hydrocracking With Interstage Feeds

Attention: Office of Petitions
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

APPLICANTS' BRIEF

This brief is in furtherance of the Notice of Appeal filed in this application on April 1, 2002. Since this application has become abandoned, a Petition for Revival is filed herewith.

I. Real Party In Interest

The real party in interest is the assignee, ABB Lummus Global Inc., a Delaware corporation.

II. Related Appeals and Interferences

There are no other appeals or any interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this pending appeal.

III. Status of Claims

The total number of claims in the application is 9.

Claims 3, 4 and 5 have been canceled.

Claims 1, 2, 6, 7, 8 and 9 are pending.

All the pending claims are rejected.

No claims are allowed.

Claims 1, 2, 6, 7, 8 and 9 are on appeal.

IV. Status of Amendments

All amendments have been entered. No amendments were filed after the final rejection.

V. Summary of the Invention

High boiling hydrocarbon materials derived from petroleum, coal or tar sand sources, usually petroleum residuum or solvent refined coal, are typically hydrocracked in ebullated (expanded) bed or fixed bed catalytic reactors in order to produce more valuable lower boiling materials such as transportation fuels or lubricating oils. In order to obtain a desired degree of hydrogenation for hydrocracking and hydrotreating, there are typically several reactors in series. In these systems, the hydrogen partial pressure declines due to the consumption of hydrogen and the production of light hydrocarbon vapors from the cracking of the heavier liquid fractions and the concentration of lighter and typically more paraffinic liquid components increases with increasing residuum

conversion. This reduction in hydrogen partial pressure and increase in concentration of lighter more paraffinic constituents results in an increase in sediment formation, limiting the residuum conversion level which can be attained based on either product quality or reactor operability constraints.

The invention relates to a two-stage catalytic bed hydrogenation process employing ebullating or fixed catalyst bed hydrogenation reactor stages (28 and 46) in series. The invention involves the introduction of an interstage feed 32 between the reactors comprising specific amounts of an aromatic solvent 36. This interstage feed may also include a portion 34 of the high boiling hydrocarbon feedstock also in specific amounts. This invention reduces the sediment formation and increases the conversion levels of the high boiling hydrocarbon feedstock.

VI. Issues

The first issue is whether claims 1, 2, 6 and 8 are unpatentable under 35 U.S.C. §103(a) over U.S. Patent No. 3,579,436 to Mounce in view of U.S. Patent No. 3,681,231 to Alpert et al.

The second issue is whether claim 7 is unpatentable under 35 U.S.C. §103(a) over Mounce in view of Alpert et al and further in view of U.S. Patent No. 4,707,466 to Beaton et al.

The third issue is whether claims 1 and 2 are additionally unpatentable along with claim 9 under 35 U.S.C. §103(a) over U.S. Patent 4,765,882 to Aldridge et al

in view of U.S. Patent 5,522,983 to Cash et al and the previously mentioned Alpert et al.

VIII. Grouping of Claims

Claims 1, 2, 6, 7 and 8 are grouped together.

Claim 9 forms a separate group. This claim recites a specific feature of the invention wherein the aromatic solvent interstage feed is mixed with a portion of the high boiling hydrocarbon feedstock.

VIII. Arguments -- Rejections Under 35 U.S.C. §103

The first rejection relating to claims 1, 2, 6 and 8 correctly indicates that Mounce discloses a multistage hydrocracking process for treating a heavy hydrocarbon feedstock and the addition of a diluent to the effluent from the first stage prior to passing this effluent to the second stage. The effluent from the second stage is disclosed as being separated by fractionation. Mounce does disclose that the diluent may be any hydrocarbon fraction boiling in the range of from 500°F to 975°F.

The Examiner acknowledges that Mounce does not disclose the use of the specific aromatic solvent diluent required in the present invention. Furthermore, it is acknowledged that the amount of diluent added in Mounce is in the range of 20% to 100% by volume of the volume of the feed which is much greater than the 5% to 10% by volume of the present invention. That would greatly increase the volume of

material that would need to be handled by the second stage reactor thereby increasing the size and cost.

In order to provide the teaching of using an aromatic solvent as the diluent in Mounce, the Examiner has cited Alpert et al wherein the conversion in a hydrocracking process for treating a heavy hydrocarbon feed is increased by the addition of an aromatic diluent stating that it would be obvious to select the aromatic solvent of Alpert et al as the diluent in Mounce. There are two major differences between the present invention and Alpert et al even as it might be combined with Mounce. Alpert et al is a single reactor system and the aromatic solvent is added to the feedstock going to that single reactor. Also, Alpert et al adds the aromatic solvent in an amount which is 20% to 70% by volume of the feed. Once again, this is far more than the amount of aromatic solvent added in the present invention. There is nothing in Alpert et al or in the combination of Alpert et al with the Mounce reference to teach or suggest adding an aromatic solvent to the effluent from the first reactor of a two reactor system. If one skilled in the art were to apply the teaching of Alpert et al to the two reactor system of Mounce, the aromatic solvent would be added to the first reactor. Furthermore, the aromatic would be added in an amount of 20% or more by volume based on the feed as opposed to the 5 to 10% of the present invention. It is the addition of the aromatic solvent according to the method of the present invention which effectively limits the sediment formation in the second reactor

with only a small quantity of aromatic solvent. Therefore, it is not obvious to use the aromatic solvent of Alpert et al as the interstage diluent in Mounce.

With respect to dependent claim 7, the Beaton et al reference has been cited. Although this reference may suggest the use of fixed bed reactors, it does not provide a teaching of the basic aspects of the present invention as expressed in parent claim 1 which are missing in Mounce and Alpert et al. Therefore claim 7 is likewise not obvious.

A separate line of rejections under 35 U.S.C. §103(a) is based on Aldridge et al in view of Cash et al and Alpert et al (claims 1, 2 and 9) and in still further view of Beaton et al (claims 6 to 8). The Aldridge et al reference does disclose a two-stage process for the conversion of a heavy hydrocarbon feed including the introduction of a quantity of feedstock to the first stage effluent prior to the second stage. It would appear that the hydroconversion of Aldridge et al would include hydrocracking as suggested by the Cash et al reference. Although this Aldridge et al reference does disclose a fresh feed addition (diluent), it does not disclose the addition of an aromatic solvent into the first stage effluent either broadly or in the specific amounts claimed. Furthermore, the Alpert et al reference does not teach or suggest the addition of an aromatic solvent to the effluent from the first stage of a two-stage hydrocracking process as fully discussed above. The most that Alpert et al suggests is the addition of an aromatic solvent to the first stage of Aldridge et al. Therefore, the present invention as now claimed is not unpatentable over Aldridge et al in view of Alpert et

al. The Beaton et al reference, which has been cited merely to show that both ebullated beds and fixed beds have been used for hydrotreating and that heavy feeds plug and deactivate fixed bed systems, does not provide the teachings which are missing from Aldridge et al and Alpert et al with respect to the aromatic solvent addition.

With respect to the provisional double patenting rejection, the claims are all limited to the blending of an aromatic solvent to the first stage effluent prior to the second stage. Although feedstock may also be blended along with the aromatic solvent, the claims are patentably distinct from the claims of the copending U.S. Application No. 09/638,375 even in view of Chervenak et al.

In view of the above remarks which show that the claimed invention is not obvious in view of the prior art, it is requested that the rejections be reversed.

Respectfully submitted,

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APPENDIX A - CLAIMS

1. A method of hydrocracking a high boiling hydrocarbon feedstock comprising the steps of:

   a. partially hydrocracking a feed portion of said feedstock comprising contacting said feed portion with hydrogen in a first reactor containing a bed of catalyst particles thereby forming an effluent mixture of C_4- light ends and lower boiling hydrocarbons and higher boiling hydrocarbons;

   b. blending an aromatic solvent with said effluent mixture thereby forming a blended effluent mixture, said aromatic solvent comprising from 5 to 10 volume % of the volume of said feed portion;

   c. further hydrocracking said blended effluent mixture comprising contacting said blended effluent mixture with hydrogen in a second reactor containing a bed of catalyst particles thereby forming a further effluent stream containing additional lower boiling hydrocarbons and the remaining unconverted higher boiling hydrocarbons; and

   d. separating said further effluent stream into a plurality of hydrocarbon product streams.

2. A method as recited in claim 1 wherein said lower boiling hydrocarbons boil below about 650°F and said higher boiling hydrocarbons boil above about 650°F.

3. Canceled.

4. Canceled.

5. Canceled.

6. A method as recited in claim 1 wherein said first and second reactors are ebullating bed reactors.

7. A method as recited in claim 1 wherein said first and second reactors are fixed bed reactors.

8. A method as recited in claim 1 wherein each of said first and second reactors are selected from fixed bed and ebullating bed reactors.

9. A method as recited in claim 1 and further comprising blending a second portion of said feedstock with said effluent mixture to form said blended effluent mixture wherein said second portion of said feedstock comprises from 10 to 20 volume % of said feed portion of said feedstock.